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(71) Applicant
Green Corporation

(Incorporated in Japan)

228 Mibu-Tei, Mibu-cho, Shimotsuga-gun,
Tochigi-ken, Japan

(72) Inventor
Kiyoji Asano

(74) Agent and/or Address for Service
Urquhart-Dykes & Lord
91 Wimpole Street, London, W1M 8AH,
United Kingdom

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S19D7 S19D8

(56) Documents cited
None

(58) Field of search
UK CL (Edition J) A6S
INT CL⁴ A63H

(54) Steering arrangement for two-wheeled vehicle toy

(57) The vehicle has a battery case (14) swingably mounted below the vehicle frame (10) to be swung laterally of the body for banking operations of the vehicle under the control of an electronic circuitry (11) which receives remote control signals from a transmitter. The front fork (40) is pivotally connected to a bracket (50) by a coupling pin (53) which passes through a tubular bearing section (50a) on the bracket (50). The internal bearing surface (50b) of the section (50a) diverges towards its lower end to allow the coupling pin (53) to be inclined with respect to the plane of the bracket (50) during banking operations. Vehicle turns are thus facilitated, with the front wheel being inclined to the vertical more than is the body of the vehicle.

FIG_2

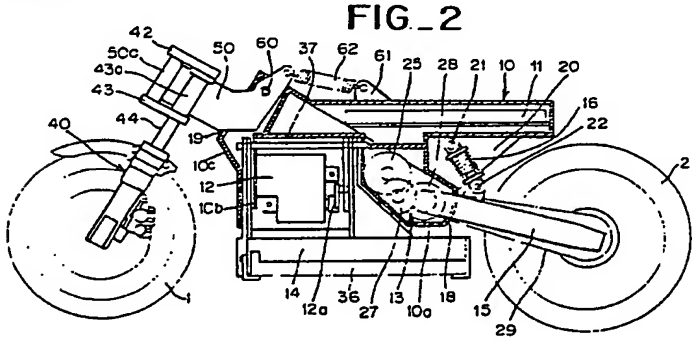

FIG_8

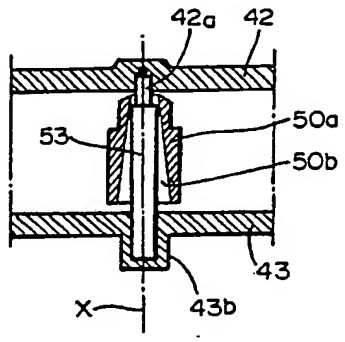

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FIG_1

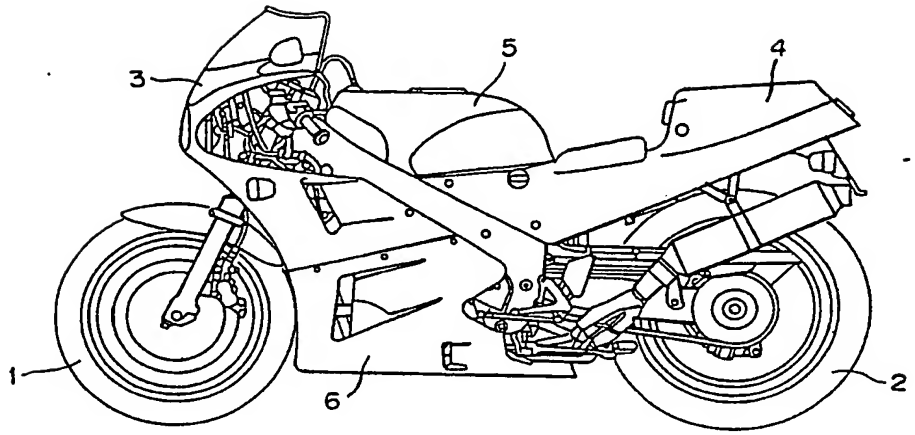

FIG_2

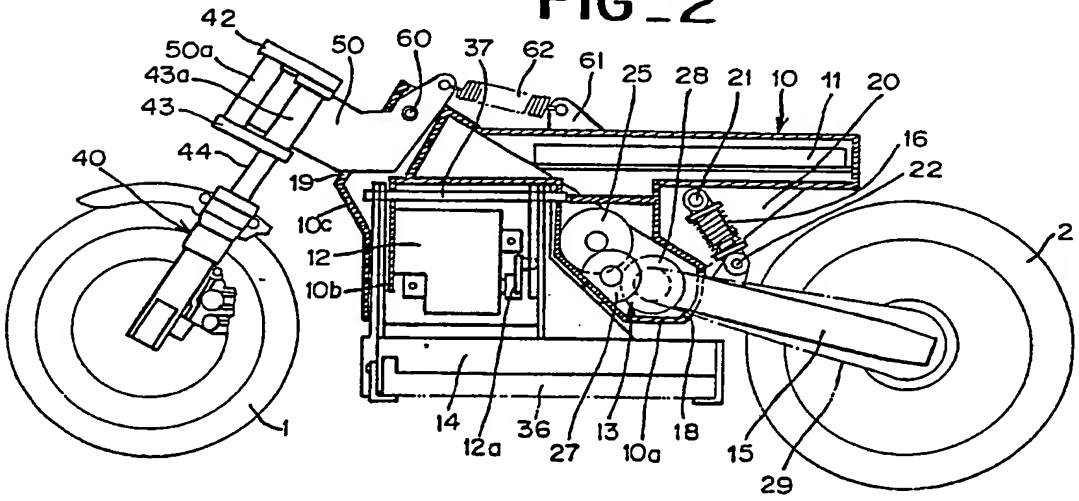

FIG_3

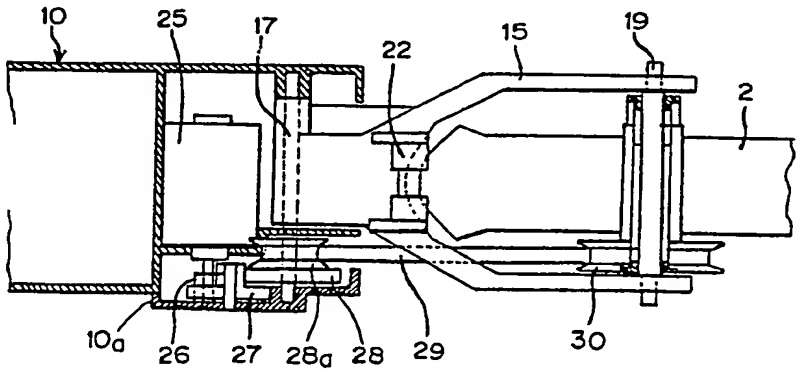

FIG_4

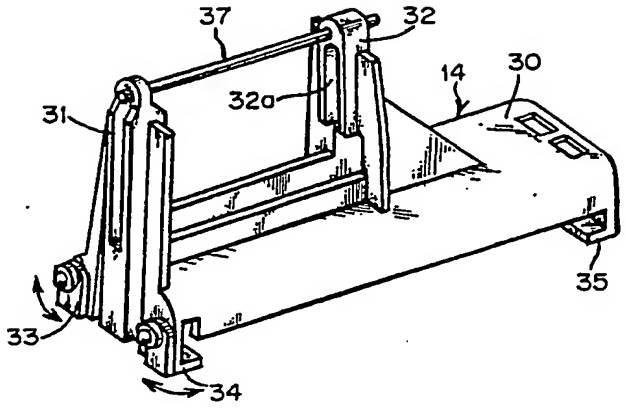

FIG_6

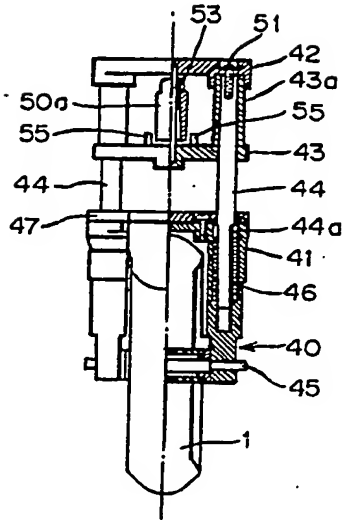

FIG_5

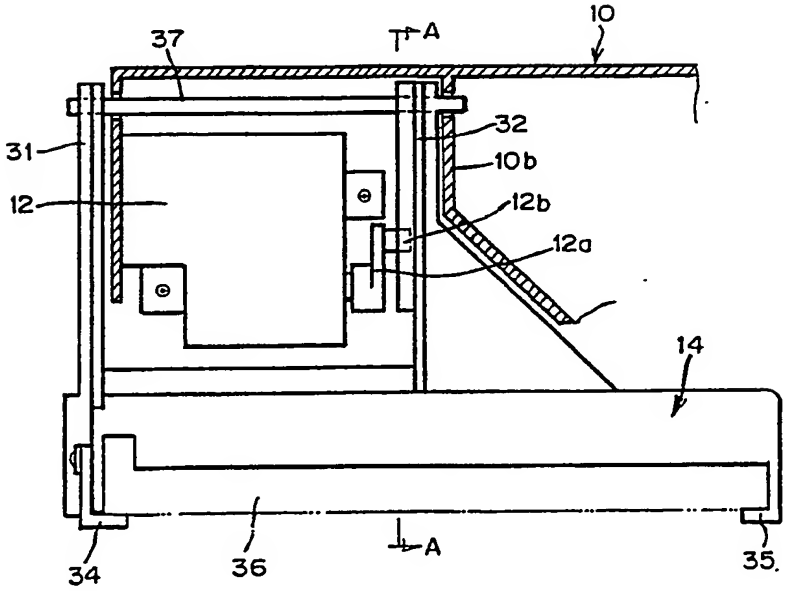

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FIG_7

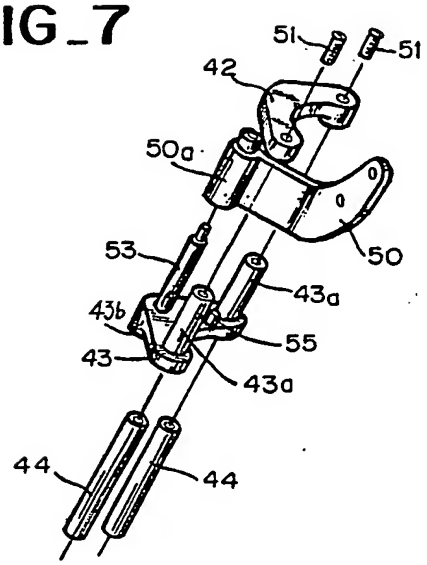

FIG_8

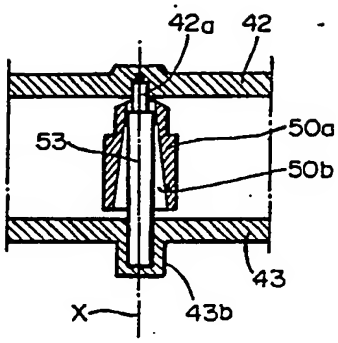

FIG_9

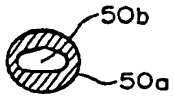

FIG_10

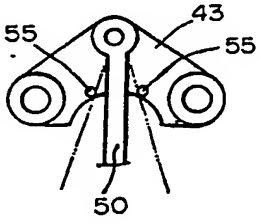

FIG_11

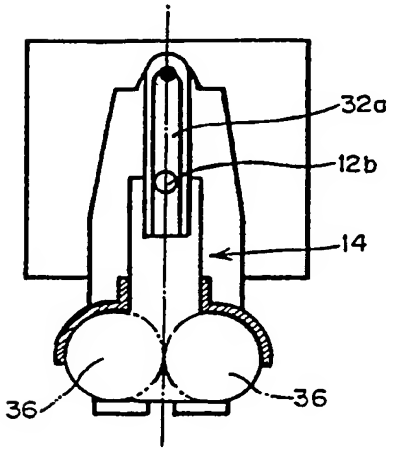

FIG_12

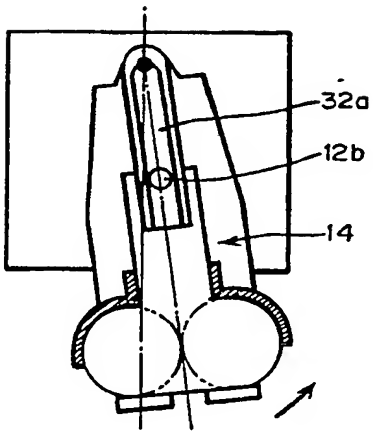

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FIG_13

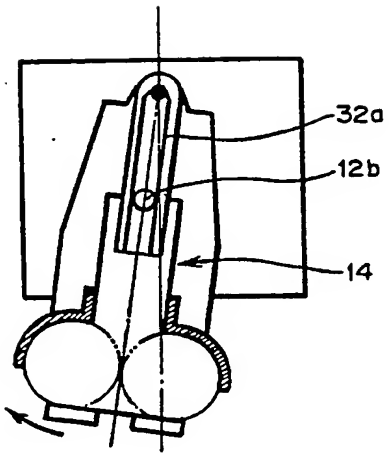


FIG_15

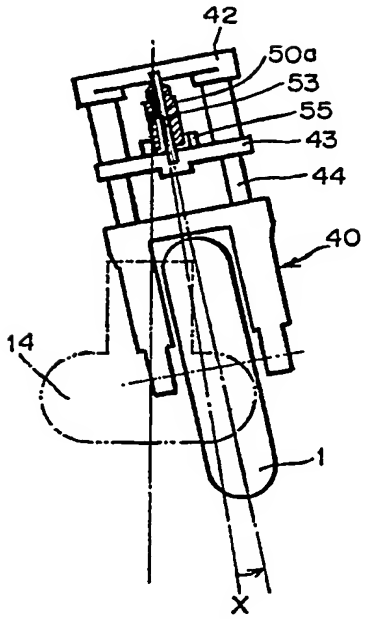
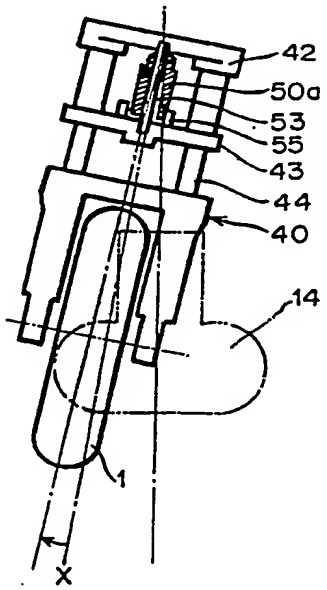


FIG_14



SPECIFICATION

1.TITLE OF THE INVENTION

Radio Control Type Two-wheeled Vehicle Toy

2.BACKGROUND OF THE INVENTION

(Field of the Invention)

The present invention relates to a radio control two-wheeled vehicle toy and more particularly to a two-wheeled vehicle toy which can smoothly and stably run in the banking state.

(Description of the Prior Art)

It has been difficult to commercialize a radio control two-wheeled vehicle toy since it is less stable in progress and has a more complicated steering mechanism than a four-wheeled vehicle.

Heretofore, for a steering mechanism for a radio control two-wheeled vehicle, the mechanism has been provided wherein a weight mounted on the top of a vehicle is moved by a radio control system and a steering section mounted to the front wheel rotates with the horizontal movement of a weight as disclosed in the Japanese Utility Model Publication No.52-24078.

This type steering mechanism, however, is supposed to cause a vehicle to fall down in rounding an acute curve

since it makes a vehicle unstable and has an inferior steering characteristic because of its weight located at the upper portion of the vehicle. Hence, it has been necessary to install a stand on the bottom of a vehicle for preventing a fall and provide a mechanism for positively swiveling right and left the steering section with the movement of the weight. As a result, the two-wheeled vehicle toy has a complicated mechanism and a less aesthetic appearance.

Furthermore, as disclosed in the Patent Laid-Open No.57-64076, the steering mechanism has been known wherein a frame loaded with a servo mechanism and a cell provided upright at the lower portion of a vehicle and thus the vehicle is inclined right and left for a steering purpose with the movement of the frame served as a weight serviced by remote control operation.

This type of steering mechanism is more stable and has a superior steering characteristic than the foregoing mechanism because the weight is located on the bottom of the vehicle. This mechanism is suited for a normal curve, but needs great right and left swing of the frame served as a center of gravity when the two-wheeled vehicle rounds a sharp curve. Because of the limited space of a two-wheeled vehicle, however, it is difficult to design the mechanism

including the frame for a motorcycle which allows for sufficient width. If the vehicle width and the swing arc of the frame is made larger, it is necessary to enlarge a swing of a crank attached to the servo mechanism. In this case, the deficiency of power supplied by the servo mechanism disables the crank to be smoothly swung. Moreover, this steering mechanism has a shortcoming that the direction cannot be rapidly switched because it takes much time to swing back the frame owing to a large swing arc.

Furthermore, the Japanese Laid-Open No.55-156799 has proposed the construction wherein a steering section located on the front wheel is linked to a servo mechanism for forcing a vehicle body to be banked by directly swinging the steering section right and left by means of remote control operation.

This type of steering mechanism, however, has a shortcoming that a two-wheeled vehicle is lack of stability in progress owing to its feature. It means that since a normal two-wheeled vehicle is a rear wheel-driven type, the steering served by only the front wheel causes a vehicle body to be unbalanced. Hence, a two-wheeled vehicle requires suppressing handling operation to minimum level.

3. SUMMARY OF THE INVENTION

It is an object of the present invention to provide a mechanism by which a two-wheeled vehicle toy can smoothly and stably run in a banking state.

As shown in Figure 2 illustrating an embodiment, the present invention is designed to swingingly mount a battery case 14 to the bottom of a vehicle and to incline a vehicle body right and left for a steering purpose with the right and left swing of the battery case 14, that is, a weight, serviced by a radio control system. As shown in Figures 6 and 7, a steering bracket 50 mounted to a vehicle and a front fork 40 supporting a front wheel 1 are connected by a coupling pin in an upper and an lower brackets 42 and 43. As shown in Figure 8, an inner aperture 50b of a bearing section 50a in the steering bracket is progressively made larger toward the lower end. The coupling pin 53 is allowed to be inclined right and left (in progress direction) with respect to the axis X of the steering bracket bearing section 50a.

In case of allowing the two-wheeled vehicle toy to round a curve, the battery case 14 (holding a battery) is swung right and left by means of a radio control system. This enables a vehicle body 14 to be inclined with the swing of

the battery case 14. At the same time, the coupling pin 53 is inclined in the similar direction to the vehicle body 14 with respect to the axis X in the bearing section 50a of the steering bracket 50, so that the front fork 40 and the front wheel 4 supported thereby are inclined more than the vehicle body. It results in producing an acute steering angle for allowing the vehicle to stably round an acute curve.

Furthermore, if the battery case 14 is swung in the opposite direction, the bearing section 50a is instantly removed in the opposite direction so as to allow the vehicle to smoothly switch the direction.

4. BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a view showing an appearance of a two-wheeled vehicle toy according to the present invention.

Figure 2 is a partially sectional view schematically showing the two-wheeled vehicle toy from which some parts like a cowl are removed.

Figure 3 is a partially sectional view schematically describing the mounting state of a rear wheel and a driving mechanism.

Figure 4 is a perspective view showing a battery case.

Figure 5 is a partially sectional view for describing the

mounting state of the battery case.

Figure 6 is a half sectional view for describing the structure of a front fork.

Figure 7 is an assembly view showing an upper and a lower brackets composing the front fork.

Figure 8 is a sectional view showing the coupling state between a bearing section of a steering bracket and a front fork.

Figure 9 is a sectional view showing the lower end of the steering bracket bearing section.

Figure 10 is a schematic view for describing the rotating state of the front fork.

Figures 11, 12 and 13 are schematic views seen from the A-A line for describing the swinging state of the battery case.

Figure 14 is a schematic view showing the state in which the vehicle body is inclined to the left side.

Figure 15 is a schematic view showing the state in which the vehicle body is inclined to the right side.

5. DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, the embodiments of the present invention will be described with reference to the appended drawings.

Figure 1 is an overall view showing a motorcycle toy to which the present invention is applied. 1 denotes a front wheel, 2 denotes a rear wheel, 3 denotes a front cowl, 4 denotes a rear cowl, 5 denotes a tank and 6 denotes a battery cover.

Figure 2 is a sectional schematic view showing the motorcycle shown in Figure 1 from which some parts such as the front cowl 3, the rear cowl 4, the tank 5, the battery cover 6 and the handle are removed. 10 denotes a box-like vehicle body frame.

This vehicle body frame 10 accommodates an electronic circuit store section 11 incorporating an electronic circuits such as a receive circuit and control circuits of various motors therein, a servo mechanism 12 and a rear wheel-driving mechanism. A battery case 14 is mounted on the bottom of the vehicle body frame so as to allow the battery case 14 to be swung right and left.

15 denotes a swing arm for supporting the rear wheel 2. As shown in Figure 3 the front end of the rear wheel is rotatively attached on a gear box section 10a of the vehicle body frame 10 by means of a pin 17. The swing arm 15 is allowed to be moved up and down within the range of a vehicle body frame cutaway portion 18 (see Fig.2) at the

center of the pin 17. The rear end of the swing arm 15 includes the rear wheel 2 rotatively attached thereto by means of a pin 19. Furthermore, as shown in Figure 2, a spring 16 is suspended between a bearing 22 provided on the top of the swing arm 15 and a bearing 21 provided on the extended portion 20 of the rear portion of the vehicle body frame 10. This spring 16 provides elastic force to the vertical movement of the swing arm 15.

The gear box section 10a accommodates a driving mechanism of the rear wheel 2. 25 denotes a motor having a driving gear 26 fixed to the shaft thereof. This driving gear 26 serves to rotate a middle gear 27, through which a driven gear 28 is rotated. The rotated gear 28 includes a pulley 28a fixed to the shaft thereof. The rotation of the driven gear 27 is conveyed to the rear wheel 2 by means of a belt 29 bridged between the pulley 28 and a pulley 30 fixed to the pin 19.

Figure 4 is a perspective view showing the battery case 14 which a case body 30 and a front and a rear supporting arms 31 and 32 compose. The case body 30 includes battery locks 33 and 34 attached to the front section thereof. These battery locks are allowed to be swung. The rear end of the case body 30 has a battery holding projection 35 formed

thereon. The case body holds the battery 36 (see Figs.2 and 11), followed by which the locks 33, 34 are swung inwardly for supporting the battery from the bottom by means of the locks 33, 34 and the pushing projection 35.

This battery case 14 is to be suspended by a pin 37 on the wall surface of the servo mechanism store section 10b of the vehicle body frame 10. As shown in Figure 5 the pin 37 penetrates through the supporting arms 31 and 32 of the battery case and the front and rear walls of the servo mechanism store section 10b. With this pin 34 served as a fulcrum the case 14 is allowed to be swung right and left against the progress direction of a two-wheeled vehicle.

The servo mechanism store section 10b in the vehicle body frame 10 accommodates the servo mechanism fixed therein. This servo mechanism 12 includes a small motor and a deceleration gear (not shown) therein, by which the crank 12a is rotated right and left against the progress direction in response to a signal fed from a transmitter. The projection 12b of the crank 12a is inserted and fixed into a slot 32a (see Fig.4) formed on the supporting arm 32 located at the rear portion of the battery case 14, so that the right and left rotation of the crank 12a allows the battery case 14 to be swung right and left.

40 denotes a front fork supporting the front wheel 1. As shown in Figure 6 the front folk is composed of right and left outer tubes 41, upper and lower brackets 42, 43 and a shaft 44 for providing coupling between these outer tubes and the brackets.

The lower end of the outer tube 41 includes the front wheel 1 rotatively engaged therewith by a pin 45. The outer tube 40 contains a spring 46 hung therein. The lower portion of the shaft 44 is inserted to the spring 46. The upper portion of the outer tube 41 contains a pushing plate 47 fixed by a screw. The pushing plate 47 serves to push a stopper 44a fixed on the middle portion of the shaft 44 from the top. Such construction allows the outer tube 46 rotatively supporting the front wheel 1 to be elastically moved up and down on the shaft 44.

The upper portion of the shaft 44 is inserted into a coupling cylinder 43a of the lower bracket 43. The upper end of the coupling cylinder 43a contains the upper bracket 42 attached thereon. The upper bracket 42 and the upper end of the shaft 44 are linked by a screw 51, so that the upper and lower brackets 42, 43, the shaft 44 and the outer tubes 41 are integrally combined with one another.

The above-identified front fork 40 is connected to a

steering bracket 50 attached on the front end of a vehicle body as shown in Figures 7 and 8. It means that the lower bracket 43 contains a boss 43b formed on the tip thereof. This boss 43b receives the lower end of a coupling pin 53 fixed thereon. This coupling pin 53 is inserted into the boss 43b in such a manner that a bearing section 50a formed on the tip of the steering bracket 50 is allowed to freely rotate. The smaller diameter portion formed on the upper end of the coupling pin 53 is fit into the aperture 42a of the upper bracket 42.

In addition, the upper bracket 42 is to be linked to a handle (not shown).

The inner aperture 50b of the bearing section 50a of the steering bracket 50 is made larger toward the lower side as shown in Figure 8. The sectional form of the inner aperture 50b is a slot. Small clearance is offered between the bearing section 50a and the upper and lower brackets 42, 43. The coupling pin 53 is allowed to be inclined right and left with respect to the axis X of the bracket bearing section 50a. The coupling pin 53 is fixed between the upper and lower brackets 42 and 43, so that the front fork 40 supporting the front wheel is swingingly supported with respect to the axis X of the steering bracket bearing

section 50a.

The inclination angle of the coupling pin 53 with respect to the bearing section 50a is preferably 4° to 6°, but is not limited thereto. The section of the inner aperture 50b may have any form if the form allows the coupling pin 53 to be swung right and left.

The rear edge of the lower bracket 43 offers a pair of stoppers 50 projected thereon in such a manner as to be situated close to both sides of the steering bracket 50. As shown in Figure 10 the swing of the front fork 40 allows the both sides of the steering bracket 50 to contact with these stoppers 50, so that the swinging range of the front fork 40 is limited. This is for avoiding the great swing of the front wheel 1. That is, since the steering of the two-wheeled vehicle greatly depends upon the right and left movement of the center of gravity, the balance of the vehicle body is lost by the great swing of the front wheel 1.

The steering bracket 50 is attached on the vehicle body frame 10 in such a manner as to be projected from the front portion of the vehicle body frame 10. As shown in Figure 2 the rear portion of this bracket 50 is rotatively attached on the bracket store section 10c of the vehicle body frame

10 by means of a pin 60. A spring 62 is suspended between the rear end of the bracket 50 and a bearing section 61 projected on the vehicle body frame 10. This spring enables the steering bracket 50 to elastically move up and down at the center of the pin 60 within the range of a cutaway portion 19.

The operation of the present invention will be described.

The battery 36 is held in the battery case 14 and then a power switch (not shown) is turned on. In case of running a motorcycle straightforward, the battery case 14 is kept in the balanced state as shown in Figure 11. In case of swiveling a motorcycle to the right, the crank 12a of the servo mechanism 12 is swung to the right in response to a signal fed from a transmitter in such a manner that the battery case 14 is also swung to the right against the progress direction as shown in Figure 12. The center of gravity of the vehicle body is moved to the right as shown in Figure 14. At the same time, the coupling pin 53 offering coupling between the front fork 40 and the steering bracket 50 is inclined to the right side with respect to the axis X of the steering bracket bearing section 50a and the front fork 40 and the front wheel 1 rotatively supported thereby are also inclined more to the right side. Hence, the two-

wheeled vehicle can swivel with the inclination angle of the front wheel 1 and therefore can acutely swivel to the right.

In case of swiveling the two-wheeled vehicle to the left, as shown in Figure 12 the swinging of the servo crank 12a to the left allows the battery store section 14 to be swung to the left and thus the center of gravity of the vehicle body to move to the left. Hence, the vehicle body is inclined to the left side as shown in Figure 15. At the same time, the coupling pin 53 is inclined to the left side with respect to the axis X and therefore the front fork 40 and the front wheel 1 supported thereby are also inclined more to the left side than the vehicle body. As a result, similarly to the foregoing principle, the two-wheeled vehicle is acutely swiveled to the left side.

In case of swiveling a two-wheeled vehicle, the front fork 40 is caused to be swung right and left with the center of the steering bracket bearing section 50a. The stoppers 55, 55 strictly limit the swinging range of the front fork 40.

The inclination angle of the coupling pin 53 against the axis X of the steering bracket bearing section 50a is defined on the

correlative relation between the running speed of the two-

wheeled vehicle and the swing angle of the battery case 14. That is, a fast speed and a small swing angle of the case define a small inclination angle. On the other hand, a slow speed and a large swing angle thereof define a large inclination angle.

As identified above, the present invention is constructed to allow the front fork 40 supporting the front wheel 1 to rotatively fit into the bearing section 50a of the steering bracket 50 and to be inclined right and left with respect to the axis X of the bearing section. Hence, the battery case 1 served as the center of gravity is allowed to be swung right and left with respect to the axis X of the bearing section and therefore the front wheel 1 is inclined more than the vehicle body in case of steering the vehicle body in the inclined state. As a result, this vehicle body makes a smaller circular movement than the vehicle body being inclined by itself, so that it can smoothly round an acute curve.

Furthermore, the present invention needs only the small swing arc of the battery case served as the center of gravity, so that it takes short time to swing back the battery case. As a result, the vehicle body can smoothly and acutely switch the direction. Moreover, since the swing of the crank of the servo mechanism is limited to a small

range, no large power is needed, so the conventional servo mechanism is available.

Furthermore, according to the present invention, since the vehicle body is a bit inclined even in case of rounding an acute curve, the running stability is significant, especially in case of swiveling a vehicle body around an acute curve at a low speed.

WHAT IS CLAIMED IS:

(1) In an radio control type two-wheeled vehicle toy including a bearing section of a bracket offered on the front of a vehicle body being rotatively connected to a front wheel supporting body by means of a coupling pin and a battery store section swingingly attached on the lower portion of said vehicle body and being steered by inclining said vehicle body right and left in accord to the swing of said battery store section holding a battery served as a weight against the progress direction, said radio control type two-wheeled vehicle toy comprising;

an inner aperture of said bearing section progressively enlarging toward the lower end in opening area as well as forming a slot in horizontal sectional form,

said coupling pin of said supporting body inserted into said inner aperture of said bearing section being allowed to be freely inclined right and left on the central axis of said bearing section in accord to the form of said inner aperture,

said supporting body being inclined more than said vehicle body when said vehicle body is inclined right or left.

(2) The radio control type two-wheeled vehicle toy claimed in claim 1 further comprising stopper means for restricting the range of a rotation angle of said front wheel supporting body.

3. A radio control type two-wheeled vehicle toy substantially as hereinbefore described with reference to, and as illustrated in, the accompanying drawings.

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